

SHIGELLOSIS

DISEASE REPORTING

In Washington

DOH receives approximately 175 to 500 reports of shigellosis per year, for an average rate of 5.6/100,000 persons. One shigellosis-associated death was reported in the last five years.

Purpose of reporting and surveillance

- To identify sources transmission (e.g., a commercial product or public water supply) and to prevent further transmission from such sources.
- When the source is a risk for only to a few individuals (e.g., an animal with diarrhea or private water supply), to inform those individuals how they can reduce their risk of exposure.
- To identify cases that may be a source of infection for others (for example, a food handler), and prevent further disease transmission.
- To educate potentially exposed persons about the signs and symptoms of disease to facilitate early diagnosis and prevent further transmission.

Reporting requirements

- Health care providers: **immediately notifiable to Local Health Jurisdiction**
- Hospitals: **immediately notifiable to Local Health Jurisdiction**
- Laboratories: notifiable within 2 workdays; specimen submission required
- Local health jurisdictions: notifiable to DOH Communicable Disease Epidemiology within 7 days of case investigation completion or summary information required within 21 days

CASE DEFINITION FOR SURVEILLANCE

Clinical criteria for diagnosis

An illness of variable severity characterized by diarrhea, fever, nausea, cramps, and tenesmus. Asymptomatic infections may occur.

Laboratory criteria for diagnosis

- Isolation of *Shigella* from a clinical specimen.

Case definition

- Probable: a clinically compatible case that is epidemiologically linked to a confirmed case.
 - Confirmed: a case that is laboratory confirmed.
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A. DESCRIPTION**1. Identification**

An acute bacterial disease involving the large and distal small intestine and characterized by diarrhea accompanied by fever, nausea and sometimes toxemia, vomiting, cramps and tenesmus. In typical cases, the stools contain blood and mucus (dysentery) resulting from mucosal ulcerations and confluent colonic crypt microabscesses caused by the invasive organisms; however, many cases present with a watery diarrhea. Convulsions may be an important complication in young children. Bacteremia is uncommon. Mild and asymptomatic infections occur. Illness is usually self-limited, lasting an average of 4-7 days. The severity of illness and the case-fatality rate are functions of the host (age and preexisting nutritional state) and the serotype. *Shigella dysenteriae* 1 (Shiga bacillus) is often associated with serious disease and severe complications that include toxic megacolon and the hemolytic-uremic syndrome; case-fatality rates have been as high as 20% among hospitalized cases even in recent years. In contrast, many infections with *S. sonnei* result in a short clinical course and an almost negligible case-fatality rate except in compromised hosts. Certain strains of *S. flexneri* can cause a reactive arthropathy (Reiter syndrome), especially in persons who are genetically predisposed by having HLA-B27 antigen.

Bacteriologic diagnosis is made by isolation of *Shigella* from feces or rectal swabs. Prompt laboratory processing of specimens and use of appropriate media (a differential, low selectivity-MacConkey agar-together with one of high selectivity-XLD or S/S agar) increase the likelihood of *Shigella* isolation. Particular effort is needed to isolate *S. dysenteriae* type 1, as this organism is inhibited by some selective media, including S/S agar. Infection is usually associated with the presence of copious numbers of fecal leukocytes detected by microscopic examination of stool mucus stained with methylene blue or gram stain.

2. Infectious Agent

The genus *Shigella* is comprised of four species or serogroups: Group A, *S. dysenteriae*; Group B, *S. flexneri*; Group C, *S. boydii*; and Group D, *S. sonnei*. Groups A, B and C, and D are further divided into 12, 14, and 18 serotypes and subtypes, respectively, designated by arabic numbers and lower case letters (e.g., *S. flexneri* 2a). In contrast, *S. sonnei* consists of only a single serotype. A specific virulence plasmid is necessary for the epithelial cell invasiveness manifested by *Shigellae*. The infectious dose for humans is low (10-100 bacteria caused disease in volunteers).

3. Worldwide Occurrence

Worldwide; it is estimated that shigellosis causes about 600,000 deaths per year in the world. Two thirds of the cases, and most of the deaths, are in children under 10 years of age. Illness in infants under 6 months is unusual. Secondary attack rates in households can be as high as 40%. Outbreaks commonly occur in homosexual men; under conditions of crowding; and where personal hygiene is poor, such as in jails, institutions for children, day care centers, mental hospitals and crowded refugee camps. Shigellosis is endemic in both tropical and temperate climates; reported cases represent only a small proportion of cases, even in developed areas.

More than one serotype is commonly present in a community; mixed infections with other intestinal pathogens also occur. In general, *S. flexneri*, *S. boydii* and *S. dysenteriae* account for most isolates from developing countries. In contrast, *S. sonnei* is most common and *S. dysenteriae* is least common in developed countries. Multiantibiotic resistant *Shigella* (including *S. dysenteriae* 1) have appeared in all areas of the world, and are related to widespread use of antimicrobial agents.

4. Reservoir

The only significant reservoir is humans. However, prolonged outbreaks have occurred in primate colonies.

5. Mode of Transmission

Mainly by direct or indirect fecal oral transmission from a symptomatic patient or a short term asymptomatic carrier. Infection may occur after the ingestion of very few (10-100) organisms. Individuals primarily responsible for transmission are those who fail to clean hands and under fingernails thoroughly after defecation. They may then spread infection to others directly by physical contact or indirectly by contaminating food. Water and milk transmission may occur as the result of direct fecal contamination; flies can transfer organisms from latrines to uncovered food items.

6. Incubation period

Usually 1-3 days, but may range from 12-96 hours; up to 1 week for *S. dysenteriae* 1.

7. Period of communicability

During acute infection and until the infectious agent is no longer present in feces, usually within 4 weeks after illness. Asymptomatic carriers may transmit infection; rarely, the carrier state may persist for months or longer. Appropriate antimicrobial treatment usually reduces duration of carriage to a few days.

8. Susceptibility and resistance

Susceptibility is general, with infection following ingestion of a small number of organisms; in endemic areas the disease is more severe in young children than in adults, among whom many infections may be asymptomatic. The elderly, the debilitated and the malnourished of all ages are particularly susceptible to severe disease and death. Breast feeding is protective for infants and young children. Studies with experimental serotype specific live oral vaccines and parenteral polysaccharide conjugate vaccines have shown protection of short duration (1 year) against infection with the homologous serotype.

B. METHODS OF CONTROL

Because of the diverse problems that may be involved in shigellosis, health authorities must be prepared to evaluate the local situation and take appropriate steps to prevent the spread of infection. It is not possible to provide a specific set of guidelines applicable to all situations. General measures to improve hygiene are important but often are difficult to implement because of their cost. An organized effort to promote careful handwashing with soap and water is the single most important control measure to decrease transmission rates in most settings.

The potentially high case-fatality rate in infections with *S. dysenteriae* 1 coupled with antibiotic resistance, calls for measures comparable to those for typhoid fever which include the need to identify source(s) of all infections. In contrast, an isolated infection with *S. sonnei* in a private home would not merit such an approach. Common source foodborne or waterborne outbreaks require prompt investigation and intervention without regard to the infecting species. Institutional outbreaks may require special measures, including separate housing for cases and new admissions, a vigorous program of supervised handwashing, and repeated cultures of patients and attendants. The most difficult outbreaks to control are: those that involve groups of young children (not yet toilet trained); the mentally deficient; and those outbreaks where there is an inadequate supply of water. Closure of affected day care centers may lead to placement of infected children in other centers (with subsequent transmission in those centers) and is not by itself an effective control measure. There is a clear need for an effective and long-lasting protective vaccine.

1. Preventive measures:

Same as those listed under typhoid fever, B1a-B1j, except that no commercial vaccine is available.

- a. Educate the public regarding the importance of handwashing. Provide suitable handwashing facilities; this is particularly important for food handlers and attendants involved in the care of patients and children.
- b. Dispose of human feces in a sanitary manner and maintain fly proof latrines. Stress use of sufficient toilet paper to minimize finger contamination. Under field conditions, dispose of feces by burial at a site distant and downstream from the source of drinking water.

- c. Protect, purify and chlorinate public water supplies, provide safe private supplies, and avoid possible back flow connections between water and sewer systems. For individual and small group protection, and while traveling or in the field, treat water chemically or by boiling.
- d. Control flies by screening, spraying with insecticides and use of insecticidal baits and traps. Control fly breeding by frequent collection and disposal of garbage, and fly control measures in latrine construction and maintenance.
- e. Use scrupulous cleanliness in food preparation and handling; refrigerate as appropriate. Particular attention should be directed to the proper storage of salads and other foods served cold. These provisions apply equally to home and public eating places. If uncertain about sanitary practices, select foods that are cooked and served hot, and fruits peeled by the consumer.
- f. Pasteurize or boil all milk and dairy products. Supervise the sanitary aspects of commercial milk production, storage and delivery.
- g. Enforce suitable quality-control procedures in industries that prepare food and drink for human consumption. Use chlorinated water for cooling during canned food processing.
- h. Limit the collection and marketing of shellfish to supplies from approved sources. Boil or steam (for at least 10 minutes) before serving.
- i. Instruct patients, convalescents and carriers in personal hygiene. Emphasize handwashing as a routine practice after defecation and before preparing and serving food.
- j. Encourage breast feeding throughout infancy; boil all milk and water used for infant feeding.
- k. Exclude *Shigella* carriers from handling food and from providing patient care. Identify and supervise typhoid carriers; culture of sewage may help in locating carriers. Chronic carriers should not be released from supervision and restriction of occupation until local or state regulations are met, often not until 3 consecutive negative cultures are obtained from authenticated fecal (and urine in schistosomiasis endemic areas) specimens taken at least 1 month apart and at least 48 hours after antimicrobial therapy has stopped. Fresh stool specimens are preferred to rectal swabs; at least 1 of the 3 consecutive negative stool specimens should be obtained by purging.

In recent studies, the new oral quinolones have produced excellent results in the treatment of the carrier, even when biliary disease exists; follow-up cultures are necessary to confirm cure.

2. Control of patient, contacts and the immediate environment:

- a. Report to local health authority. Recognition and report of outbreaks in child care centers and institutions are especially important.
- b. Isolation: During acute illness, enteric precautions. Because of the extremely small infective dose, patients with known *Shigella* infections should not be employed to handle food or to provide child or patient care until 2 successive fecal samples or rectal swabs (collected 24 or more hours apart, but not sooner than 48 hours following discontinuance of antimicrobials) are found to be free of *Shigella*. Patients

- must be advised of the importance and effectiveness of handwashing with soap and water after defecation as a means of curtailing transmission of *Shigella* to contacts.
- c. Concurrent disinfection: Of feces and contaminated articles. In communities with a modern and adequate sewage disposal system, feces can be discharged directly into sewers without preliminary disinfection. Terminal cleaning.
 - d. Quarantine: None.
 - e. Management of contacts: Whenever feasible, ill contacts of shigellosis patients should be excluded from food handling and the care of children or patients until diarrhea ceases and 2 successive negative stool cultures are obtained at least 24 hours apart and at least 48 hours after discontinuance of antibiotics. Thorough handwashing after defecation and before handling food or caring for children or patients must be stressed if such contacts are unavoidable.
 - f. Investigation of contacts and source of infection: The search for unrecognized mild cases and convalescent carriers among contacts may be unproductive in sporadic cases and seldom contributes to the control of an outbreak. Cultures of contacts should generally be confined to food handlers, attendants and children in hospitals, and other situations where the spread of infection is particularly likely.
 - g. Specific treatment: Fluid and electrolyte replacement is important when diarrhea is watery or there are signs of dehydration (see CHOLERA, B2g). Antibacterials (oral TMP-SMX, ciprofloxacin or ofloxacin in adults; oral TMP-SMX, ampicillin or nalidixic acid or parenteral ceftriaxone in children) shorten the duration and severity of illness and the duration of pathogen excretion; they should be used in individual cases if warranted by the severity of the illness or to protect contacts (i.e., in day care centers or institutions) when epidemiologically indicated. During the past five decades *Shigella* have earned notoriety for the propensity with which they have acquired resistance to newly introduced antimicrobials that were initially highly effective. Multidrug resistance is common, so the choice of specific agents will depend on the antibiogram of the isolated strain or on local antimicrobial susceptibility patterns. In many areas, the high prevalence of *Shigella* resistance to TMP-SMX, ampicillin and tetracycline has resulted in a reliance on fluoroquinolones such as ciprofloxacin as first line therapy. The use of ant motility agents such as loperamide is contraindicated in children and is generally discouraged in adults as these drugs may prolong the illness. Nevertheless, if they are administered in an attempt to alleviate the severe cramps that often accompany shigellosis, ant motility agents should be limited to only 1 or at most 2 doses and should never be given without concomitant antimicrobial therapy.

3. Epidemic measures

- a. Report at once to the local health authority any group of cases of acute diarrheal disorder, even in the absence of specific identification of the causal agent.
- b. Investigate food, water and milk supplies, and use general sanitation measures.
- c. Prophylactic administration of antibiotics is not recommended.
- d. Publicize the importance of handwashing after defecation; provide soap and individual paper towels if otherwise not available.

4. *International measures*

WHO Collaborating Centres.